

REMARKS

Responsive to the outstanding Office Action, applicant has carefully studied the Examiner's rejections and the comments relative thereto. Response to this action, with a 2 month extension, was due by July 19, 2003. As July 19, 2003, fell on a Saturday, it is respectfully submitted that the response to this amendment filed today, Monday, July 21, 2003, with a two month extension, is timely filed. Favorable reconsideration of the application is respectfully requested in light of the amendments and following detailed arguments.

In this response, claims 12, 13, 27 and 28 have been cancelled, and claim 14 has been amended. Claims 1-11 were previously cancelled. It is respectfully submitted that no new matter was presented in this amendment.

In response to the Examiner's earlier election requirement, claims 12 and 13 have been cancelled herein, without prejudice towards their pursuit in a later filed continuation application.

Claims 14, 15 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by DE 43 05 414 A1 to Wandke. In this respect, the Examiner states that Wandke teaches coating a substrate with a metal oxide layer, especially a stannic oxide layer, in a vacuum in which a corresponding metal target is inserted into a corresponding chamber and eroded, and this erosion coats the substrate, whereby an oxygen-containing plasma arising from a corresponding basic gas mixture is created in the area between the target and substrate. Further, referring to page 1 of the Wandke translation, the Examiner indicates that the disadvantage of this process, namely that the oxidizing atmosphere also affects the target, and the target surface becomes increasingly coated with oxide which negatively influences the overall procedure as, e.g. the coating rate decreases, is solved by using a balanced oxidizing and reducing basic gas mixture consisting of at least 20 percent by volume oxygen, hydrogen and a gaseous hydrocarbon or halogenated hydrocarbon in the coating procedure. This mixture may also contain 5-40 percent by volume argon.

Claims 14-29 were rejected under 35 U.S.C. 103 (a) as being unpatentable over DE 43 05 414 A1 in view of U.S. Patent No. 6,277,523 to Giron. The Examiner notes that Wandke differs from the present claims in that the hydrocarbon being saturated is not discussed, the volumetric

ratio of added hydrocarbon to added oxygen is not discussed, the volumetric ratio of added noble gas to oxygen is not discussed, the tin oxide layer being electrochromic is not discussed, the target being tungsten is not discussed, the target containing molybdenum, titanium, cerium, vanadium and/or zirconium is not discussed, and the thickness of the electrochromic layer is not discussed. In this respect, the Examiner takes the position that Giron teaches an inhibited electrochromic layer of WO_3 , Nb_2O_3 , SnO_2 , Bi_2O_3 , TiO_2 , V_2O_5 , hydrogenated nickel oxide or MoO_3 material which exists in a decolored or only slightly colored state, and that all the oxide-based layers are obtained by this technique using a metal target, but in a reactive atmosphere containing oxygen. Continuing, the Examiner states that since Giron teaches utilizing a metal target to deposit the corresponding metal oxide it would be obvious to utilize targets containing tungsten, molybdenum, titanium, cerium, vanadium and/or zirconium.

Before discussing the prior art in detail, applicants would like to review the invention as disclosed in independent claim 14. Claim 14 discloses a process for the production of an electrochromic coating on a substrate by chemical sputtering of a target. The target consists of tungsten or a tungsten alloy or contains at least one of Molybdenum, Titanium, Cerium, Vanadium and Zirconium. The coating atmosphere contains a noble gas and hydrogen ions. At least one gaseous hydrocarbon is added to the coating atmosphere.

With regard to the rejection of claim 14 under 35 USC §102, it is respectfully submitted that the Examiner has already acknowledged that subject matter of amended claim 14 is not anticipated by Wandke. Specifically, Wandke does not anticipate chemical sputtering of a target consisting of tungsten or a tungsten alloy or containing at least one of Molybdenum, Titanium, Cerium, Vanadium and Zirconium. Therefore, it is believed that the rejection of claim 14 under 35 USC §102 should be reconsidered and withdrawn.

With regard to the rejection under 35 USC §103, it is respectfully submitted that the Wandke reference is limited to the target being a tin oxide composition. The Giron reference must be incorporated for the examiner to show claim 14 as being obvious. For the reasons set forth below, applicants contend that the Wandke reference is not properly combinable with the Giron reference.

As discussed previously, Wandke does not relate to electrochromic coatings, since Wandke refers to sputtering tin oxide, which is not a typical electrochromic material. Especially, for electrochromic elements using lithium ions as charge carriers, tin oxide is unsuitable as an electrochromic coating.

The present invention aims at improving the process for producing electrochromic coatings. The problem which is to be solved by the present invention is to improve a process called conditioning, to which electrochromic coatings have to be subjected before they have a sufficiently high reversible storage capacity for ions which makes them suitable for use in electrochromic pane arrangements. The applicants have surprisingly found that a process for producing electrochromic coatings by sputtering in an atmosphere containing a noble gas and hydrocarbon along with oxygen, produces electrochromic coatings having a significantly reduced blind charge. This can be seen in Examples 1 to 4, summarized in Table 1. The effect of the blind charge thus reduced is that the electrochromic coatings which are a product of the inventive production process herein claimed, show a higher coloring efficiency.

The Wandke reference is directed to a method of coating a substrate with a metal oxide layer, specifically a stannic oxide layer in a vacuum.

The applicants submit that Giron discloses a technique for producing electrochromic glazings using a metal target and sputtering in a reactive atmosphere containing both oxygen and optionally hydrogen. Giron does not disclose the use of a hydrocarbon containing sputtering atmosphere as called for in claim 14.

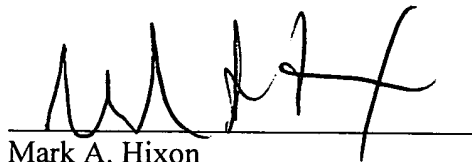
The Examiner disagrees with applicants' assertion that one skilled in the art would not look to Wandke in order to modify the sputtering atmosphere of Giron because Wandke only refers to tin as a sputtering target metal, which is generally unsuitable for electrochromic coatings, especially those based on the insertion of lithium ions. The Examiner notes that Giron teaches that stannic oxide is an electrochromic material. Applicants assert that, as shown in column 4, lines 22-44, stannic oxide is shown as a potential electrochromic material where the device operates by the reversible insertion of H⁺ ions. The following paragraph notes that where the device operates by the insertion of Li⁺ ions, suggested materials do not include stannic oxide.

Applicants assert that, as noted previously, stannic oxide is not a suitable electrochromic material where lithium ions are to be utilized.

As discussed previously, the Wandke reference teaches the use of stannic oxide target in a sputtering process. Because of the fact that lithium ions may or may not be used as charge carriers in the Giron patent, one skilled in the art would not look to the Wandke reference to modify the atmosphere of Giron. Further, the present invention teaches that lithium ions can be used as charge carriers. Wandke only utilizes stannic oxide layers, which are unsuitable for use as charge carriers where lithium ions are present (which is, in essence confirmed by the Giron reference, as shown above.) Thus, the Wandke and Giron references cannot be properly combined to disclose the present invention, as claimed in claim 14. Any reasonable combination of Wandke and Giron can only be made in retrospect as Wandke does not give any hint as to the effects the hydrocarbon containing sputtering atmosphere would have on the resulting electrochromic-coating. It is only in knowledge of the present invention that the skilled person would have a motivation to alter the sputtering conditions of Giron. Accordingly, any rejection of claim 14 and claims 15 to 29 dependent thereon based on a combination of the Wandke and Giron disclosures is untenable whereby allowance of claims 14 to 29 is urged to be in order.

Should the Examiner wish to modify any of the language of the claims, applicants' attorney suggests a telephone interview in order to expedite the prosecution of the application.

Respectfully submitted,



Mark A. Hixon
Registration No. 44,766

ATTORNEYS

Marshall & Melhorn, LLC
Four SeaGate - 8th Floor
Toledo, Ohio 43604
(419) 249-7114
(419) 249-7151 Facsimile